

## Newly recorded subfamily, genus and species of Crabronidae (Hymenoptera) from China

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**Abstract:** The subfamily Dinetinae W. Fox, genus *Dinetus* Panzer and species *Dinetus arenarius* Kazenas are reported from China for the first time. In addition, a key to the worldwide species of the genus *Dinetus* is provided. The examined specimens are deposited in the Insect Collections of Yunnan Agricultural University (YNAU), Kunming, Yunnan Province, China.

**Key words:** Dinetinae; *Dinetus*; taxonomy; key

方头泥蜂科中国新纪录亚科、属及种类记述（膜翅目）

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**摘要:** 记述我国方头泥蜂科 Crabronidae 1 中国新纪录亚科: 转泥蜂亚科 Dinetinae、1 中国新纪录属: 转泥蜂属 *Dinetus* Panzer, 及 1 中国新纪录种: 沙转泥蜂 *Dinetus arenarius* Kazenas, 1973, 编制了转泥蜂属世界已知种类检索表。研究标本保存于云南农业大学昆虫标本室。

**关键词:** 转泥蜂亚科; 转泥蜂属; 分类; 检索表

### Introduction

The subfamily Dinetinae (Hymenoptera: Crabronidae) was described by Fox in 1895 based on the type genus *Dinetus* Panzer, 1806. De Beaumont (1960) classified the Dinetinae as a tribe (Dineini) in the subfamily Larrinae; then Bohart and Menke (1976) revised the genera of sphecid wasps worldwide and transferred the Dineini (currently Dinetinae) into Astatinae; Melo analyzed the wasps by means of cladistics in 1999 and placed *Dinetus* under Crabronidae (Melo 1999). Pulawski established the world catalogue of sphecid wasps in 2003, and placed Dinetinae as a subfamily of Crabronidae with only one genus (*Dinetus* Panzer) (Pulawski, 2018).

In 1960, six species and one subspecies of genus *Dinetus* were reported from Europe by de Beaumont and a key to species was provided (de Beaumont 1960). Subsequently, Kazenas described the *Dinetus* species from Kazakhstan and Central Asia between 1973–2002 (Kazenas 1973, 1997, 1998, 1999, 2002); and then Roche (2007) described the species from Egypt. At present, the subfamily Dinetinae includes only one genus, 12 species and one subspecies worldwide. Of these, 11 species occur in the Palearctic, one species in both the

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Palaearctic and Ethiopian Regions, and one subspecies in both the Palaearctic and Oriental Regions (Guichard 1980; Pulawski 2018). No species has been previously recorded from China.

The Dinetinae wasps usually inhabit sand dunes. The females build their nests in sand dunes, prey on hemipteran insects, transfer their prey into their nests, and then lay their eggs in these nests.

During our study of Crabronidae from China, the subfamily Dinetinae, genus *Dinetus* and *Dinetus arenarius* Kazenas was discovered from China for the first time. This newly recorded species is redescribed and illustrated, and a key to the species of *Dinetus* worldwide is provided. The examined specimens are deposited in the Insect Collections of Yunnan Agricultural University (YNAU), Kunming, Yunnan Province, China.

## Material and methods

Specimens were observed with the aid of a stereomicroscope with an ocular micrometer. Photographs were made by the Keyence (VHX–5000) Micrographic System. Abbreviations in the text are as follows: POD – postocellar distance (distance between inner margins of hind ocelli); OOD – ocellocular distance (distance between out margin of hind ocellus and nearest inner orbit).

## Taxonomy

### Dinetinae W. Fox, 1895, new record to China

Dinetinae W. Fox, 1895: 305. Based on *Dinetus* Panzer, 1806 (stem: Dinet-).

Diagnosis. Eyes dichoptic, without malar space; mandible notched externo-ventrally, palpal segments essentially symmetrical; lower frons with median sulcus; lower margin of antennal socket comma-shaped with projection, scape longer than flagellomere I, antenna curved toward apex; scrobal sulcus weak or absent; female with two midtibial spurs, male without spur; forewing with two submarginal cells, outer margin of submarginal cell I appendiculate or not angulate, forewing media diverging close to cu-a but sometimes on either side of it; hindwing jugal lobe 0.5 to 0.6 times as long as anal area, vein A2 of hindwing absent (Bohart & Menke 1976).

### *Dinetus* Panzer, 1806, new record to China

*Dinetus* Panzer, 1806: 191.

Diagnosis. Frons with dense long setae, propleuron and gena with inconspicuous setae; anterior margin of clypeus with two teeth; antenna rolled, flagellum flat usually; submarginal cell II of forewing receiving recurrent vein II; female trochanter and femur of fore leg with psammophore, male psammophore absent (Bohart & Menke 1976).

The updated key to *Dinetus* species is as follows: (based on Kazenas *et al.* 1999; Guichard 1980; de Beaumont 1960d):

### Identification key to the species of *Dinetus* Panzer worldwide

1. Ocellocular distance as long as hind ocellar diameter..... 2

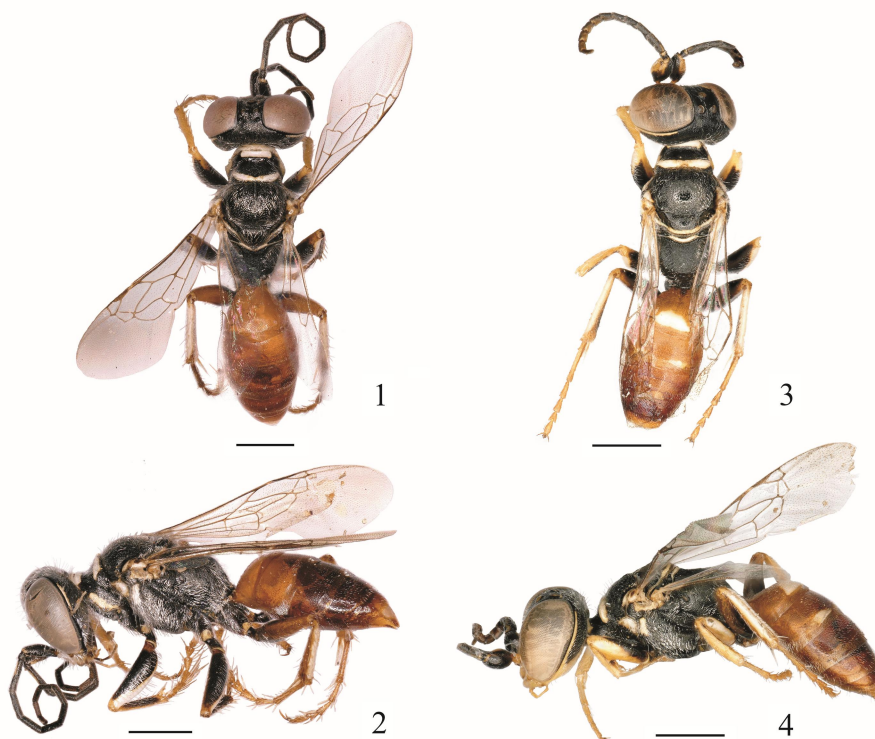
- Ocellocular distance shorter than hind ocellar diameter.....3
- 2. Gastral terga with clear, fine punctures (♀♂). Flagellum articles flattened, unexpanded; fore tarsomere I with six strongly expanded spines (seven spines usually), propleuron and scutellum yellow (♂).....  
..... *D. pictus* (Fabricius)
- Gastral terga without clear, fine punctures nearly (♀♂). Flagellomere IX expanded medially, flagellomere X expanded basally; fore tarsomere I with five inconspicuously expanded spines, propleuron and scutellum black (♂).....*D. simplicipes* Saunders
- 3. Outer margin of subdiscoidal cell vertical, tarsomere with fine spines apically.....4
- Outer margin of subdiscoidal cell oblique, tarsomere without fine spines apically..... 8
- 4. Frons and vertex without sparse pubescence; lateral and ventral surface of mesosoma yellowish entirely. Anterior margin of clypeus arcuate, with two rounded teeth (♀). Anterior margin of clypeus with two triangular teeth medially; flagellum columnar mostly, flagellomeres VII–X slightly deformed, last segment flattened; fore femur without tooth, fore trochanter with a broad tooth ventrally (♂).....  
.....*D. psammophilus* Kazenas
- Frons and vertex with sparse pubescence; lateral and ventral surface of mesosoma black partly. Clypeus of both female and male, antennae of male different from above. Fore femora and trochanter without or with tooth (♂)..... 5
- 5. Mesonotum with a transverse yellowish band near posterior margin; mid femora yellowish (red or black in some female specimens); mesosoma yellow or with yellow (sometimes red) spots ventrally. Fore femur without tooth; propodeal enclosure without pubescence almost (♂).....6
- Mesonotum black, without spot or band; mid femora largely black or with a black spot on inner surface ventrally, mesosoma ventrally black, with yellow spot. Fore femora with a tooth ventrally; propodeal enclosure of propodeum with dense pubescence on both sides (♂).....7
- 6. Ventral surface of mandible with pointed projection subapically, a strong tooth medially, and an obvious notch between projection and tooth; clypeus convex medially in lateral view (♀). Ventral surface of mandible with deep notch basally; fore trochanter without tooth (♂).....*D. turanicus* Kazenas
- Mandible normal; clypeus flat medially in lateral view (♀). Mandible without obvious notch basally; fore trochanter with a tooth ventrally (♂).....*D. dentipes* Saunders
- 7. Anterior margin of clypeus with two triangular teeth; scape largely black; hind femora black at least at base (♀). Fore trochanter without teeth, anterior margin of clypeus with notch medially; flagellomeres I–II normal (♂).....*D. arenarius* Kazenas
- Anterior margin of clypeus with two rounded teeth; scape ventrally yellowish; hind femora red entirely (♀). Fore trochanter with a tooth ventrally, anterior margin of clypeus with two blunt teeth; flagellomeres I–II conspicuously shortened (♂).....*D. wojciechi* Kazenas
- 8. Propodeum with conspicuous, short, silvery pubescence apico-laterally..... 9
- Propodeum without conspicuous silvery pubescence..... 11
- 9. Antennae joints III above yellowish, joints 2nd + 3rd slightly longer than scape (♀). Fore trochanter with small tooth (♂).....*D. venustus* de Beaumont
- Antennae joints III ferruginous or yellow, joints 2nd + 3rd distinctly longer than scape (♀). Fore trochanter without small tooth (♂).....10
- 10. Body largely yellow, without white spot.....*D. cereolus* Morice
- Body largely ferruginous, with white spot..... *D. pulawskii* de Beaumont
- 11. Body largely ferruginous. Propodeal enclosure of propodeum with fine transverse or oblique striae (♀). Flagellomeres III–X beneath excavated, last segment truncate and with a tooth; eyes without silvery pubescence along inner margin or fore trochanter with small tooth (♂).....*D. nabataeus* de Beaumont
- Black. Propodeal enclosure of propodeum shiny, with fine reticulation (♀). Antennae normal, last segment

about twice as long as two preceding ones; silvery pubescence along inner margins of eyes nearly reaching to mid ocellus; fore trochanter with small tooth (♂).....*D. porcellaneus* Guichard

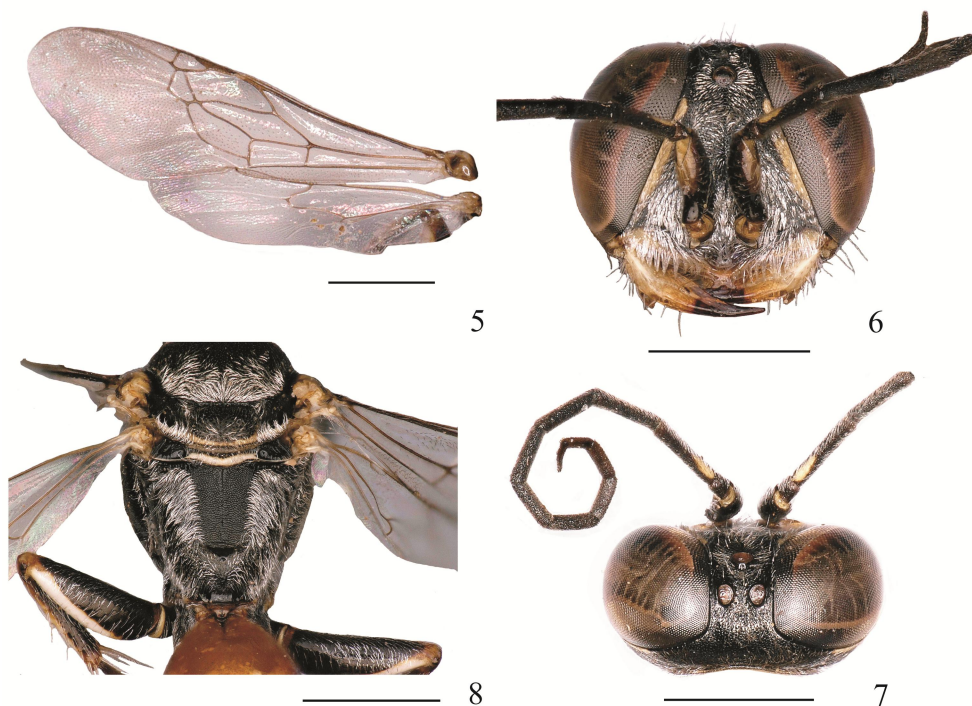
***Dinetus arenarius* Kazenas, 1973** (Figs. 1–18), new record to China

*Dinetus arenarius* Kazenas, 1973: 16.

**Description.** Female (Figs. 1, 2, 5–11). Body length 6.2–6.5 mm, black. Ivory or yellowish area present at basal half of mandible, anterior margin of clypeus, labrum, spots on antennal article I apically and III basally in dorsal view, narrow bands on both sides of frons, narrow band on mid and upper gena near outer margin of eyes, transverse streak on pronotum basally, collar, pronotal lobe, tegula, spot on mesopleuron basally, narrow band on posterior margin of scutellum medially, transverse band on posterior margin of metanotum, two spots on gastral tergum I medially and tergum II subapically respectively, bands on both fore and mid femora ventrally, tibiae dorsally, basal half of last gastral segment. Wings hyaline, yellowish brown (Fig. 5). Apical half of mandible, dorsal surface of fore femora apically, fore tibiae dorsally, inner side of mid femora and outer side of mid tibiae, hind femora and tibiae ventrally, tarsus, tarsal claw, gaster yellowish brown or reddish brown. Setae on clypeus laterally, frons and ocellar area dense, appressed; on gena long, silvery, on mesoscutum and scutellum slightly dense, long, silvery; on mesopleuron, propodeal enclosure laterally, posterior and lateral surfaces of propodeum dense, long and silvery; and on posterior margin of gastral terga I–III dense and short.



Figures 1–4. *Dinetus arenarius* Kazenas, 1973. 1, 2. ♀. 3, 4. ♂. 1, 3. Habitus, dorsal views; 2, 4. Habitus, lateral views. Scale bars = 1 mm.

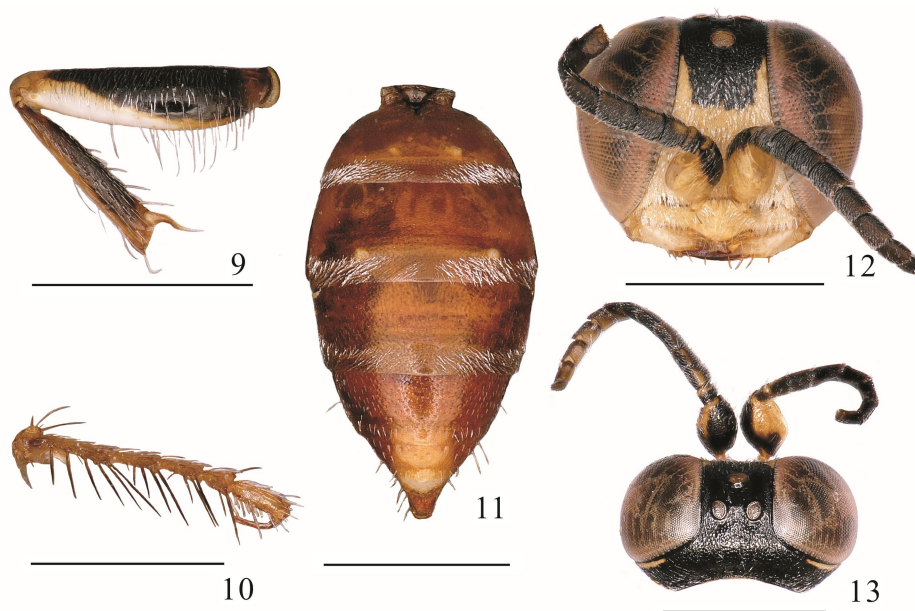


Figures 5–8. *Dinetus arenarius* Kazenas, 1973, ♀. 5. Wing; 6. Head, frontal view; 7. Head, dorsal view; 8. Propodeum, dorsal view. Scale bars = 1 mm.

**Head.** Mandible pointed apically, externo-ventral area notched medially, and with a tooth subbasally; clypeus slightly convex medially in lateral view, anterior margin narrowly produced and bidentate medially; lower margin of antennal socket comma-shaped with projection (Fig. 6); scape simple, length of flagellum I about 5 times width, length of flagellum I : II = 1.2 : 1, last joint of flagellum compressed; frontal line distinct; upper frons, ocellar area and vertex with dense, fine punctures. OOD : POD = 2 : 1 (Fig. 7).

**Mesosoma.** Anterior area of pronotum smooth and shiny with fine, sparse punctures, and with dentate projections laterally, posterior area of pronotum with dense, fine punctures; mesoscutum with dense, large punctures, admedian line and notaulus present; mesopleuron with dense and fine punctures; mesosternum with fine sculptures, scattered with large punctures; scutellum with dense, large punctures; metanotum with several longitudinal, oblique and sturdy rugae laterally; propodeal enclosure U-shaped medially, with inconspicuous, shallow furrow at middle, both sides of the furrow with dense, round granular punctures (Fig. 8), lateral surface of propodeum with conspicuous sculptures, posterior surfaces of propodeum with oblique, fine sculptures; outer side of fore tarsus with foretarsal rake (Fig. 9), outer surface of tarsus I with six sturdy spines (Fig. 10).

**Metasoma.** Gastral terga I–IV with fine sculptures, terga I–III with dense, fine to midsize punctures, tergum IV with sparse punctures, terga I–IV well-defined, with narrow bands (Fig. 11); gastral sterna I–VI with fine sculptures, mixed with sparse, large punctures; pygidial plate U-shaped, smooth and shiny, with several punctures.



Figures 9–13. *Dinetus arenarius* Kazenas, 1973. 9, 10, 11: ♀. 12, 13: ♂. 9. Fore femur, tibia; 10. Fore tarsus and tarsal claw; 11. Mesosoma, dorsal view; 12. Head, frontal view; 13. Head, dorsal view. Scale bars = 1 mm.



Figures 14–18. *Dinetus arenarius* Kazenas, 1973, ♂. 14. Mesosoma, dorsal view; 15. Antenna; 16. Fore leg; 17. Male genitalia, dorsal view. 18. Male genitalia, lateral view. Scale bars = 1 mm (Figs. 14–16); 0.1 mm (Figs. 17, 18).

Male (Figs. 3, 4, 12–18). Similar to female except as follows: body length 5.0–5.5 mm. Black. Yellowish white or yellowish present at clypeus, scape ventrally, spots on antennal articles II–V dorsally, lower frons, lower gena (Figs. 12, 13), spots on lower propleuron and pronotal lobe, stripe and spots on upper mesopleuron, apical half of fore and mid trochanters beneath, fore and mid femora beneath, fore and mid tibiae above, spot on gastral tergum I subapically, two spots on gastral tergum II posteriorly, tergum V posteriorly, tergum VI; tarsus, claws, gastral segments I–II (except spots) yellowish brown; gastral segments III–V reddish brown (Fig. 14). Externo-ventral area of mandible with one tooth medially, scape expanded into a rugby ball, antennal articles IV–XIII excavated ventrally, flattened and rolled (Fig. 15); fore femur beneath with a distinct tooth medially (Fig. 16); Male genitalia reddish brown (Fig. 17) (Figure 18 showed it fulvous because of prolonged alcohol immersion), volsella apically black, setae on gonostyle apically sparse, long and silvery (Figs. 17, 18).

**Specimens examined. China:** 7♀, Inner Mongolia, Eqianqi, Dundatu, 37°43'N 108°10'E, 24-VII-2006, coll. Tingjin LI & Ming LUO; 5♀, Inner Mongolia, Eerduosi, Wushenqi, Batuwang, 39°48'N 110°19'E, 28-VII-2006, coll. Tingjin LI; 1♀1♂, Inner Mongolia, Eerduosi, Wushenqi Station, 38°33'N 108°52', 27-VII-2006, coll. Tingjin LI; 3♀1♂, Inner Mongolia, Eerduosi, eastern suburbs of Wushenqi, 38°36'N 108°37'E, 29-VII-2006, coll. Ming LUO, Tingjin LI & Haiyan ZHANG.

Distribution. China (Inner Mongolia); Kazakhstan.

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